MANUAL

IMS-HPS-100 Setup Guide
Hot-Plug Module

14th November 2019
Meinberg Funkuhren GmbH & Co. KG
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1 Imprint

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Date:  2016-05-03
2 Safety Instructions for hot pluggable Modules

Check before every maintenance work on the system:

- If a data backup is required?
- Is a backup required, verify the data recovery which is done by this backup.
- Make sure to avoid any static discharge while working - use a grounding cable and/or antistatic gloves during installation and removal of hot pluggable components.
- If you are replacing a hot pluggable power supply, unplug the power cable prior to removing the module from the case.
- Never open a power supply. In power supplies dangerous voltages can still remain even after disconnection from the power supply. Always send power supplies back to the manufacturer for maintenance.

Exchange of hot-swap components

- Ensure that components which will be replaced during operation, always be treated with the utmost care. Avoid contact with live components.
- Electrostatic discharge can damage electronic components. For this reason, ensure protection against electrostatic discharges by wearing anti-static shoes while working with the system.
- Take care when removing and installing the hot-plug modules. Always work with the utmost caution. Touch the modules only at the edges.
- Place the module out of the box or after removal from the system with the component side to the top on a grounded and static-free surface.
- Storage of an IMS module must be done in a dry place.
- Installation or removal from hot-swap components only by authorized personnel!
2.1 Additional Safety Hints

This manual contains important information for the installation and operation of this device as well as for your safety. Make sure to read carefully before installing and commissioning the device.

Certain operating conditions may require the observance of additional safety regulations not covered by this manual. Nonobservance of this manual will lead to a significant abatement of the security provided by this device. Security of the facility where this product is integrated lies in the responsibility of the installer.

The device must be used only for purpose named in this manual, any other use especially operation above the limits specified in this document is considered as improper use.

Keep all documents provided with the device for later reference.

This manual is exclusively for qualified electricians or by a qualified electrician trained personnel who are familiar with the applicable national standards and specifications, in particular for the construction of high voltage devices.

2.2 Supply Voltage

WARNING!
This device is powered by a dangerous voltage. Nonobservance of the safety instructions of this manual may lead to serious damage to persons and property and to danger to life! Installation, commissioning, maintenance and operation of this device are to be carried out by qualified personnel only.

The general safety instructions and standards (e.g. IEC, DIN, VDE, EN) for installation and work with high voltage equipment as well as the respective national standards and laws must be observed.

NONOBSERVANCE MAY LEAD TO SERIOUS DAMAGE TO PERSONS AND PROPERTY AND TO DANGER TO LIFE!

The device may not be opened. Repair services may only be carried out by the manufacturer.

Supply lines for this device must be equipped via an appropriate switch that must be mounted close to the device and must be marked as a mains switch for the device.

To ensure safe operation supply mains connected to this device must be equipped with a fuse and a fault-current circuit breaker according to the applicable national standards for safe operation.

The device must be connected to a protective earth with low grounding resistance according to the applicable national rules.
2.3 Cabling

**WARNING!**
DANGER TO LIFE BY ELECTRICAL SHOCK! NO LIVE WORKING!
Wiring or any other work done on the connectors particularly when connectors are opened may never be carried out when the installation is energized. All connectors must be covered to prevent accidental contact to live parts.

ALWAYS ENSURE A PROPER INSTALLATION!
3 Replacement or Installation of a Hot-pluggable IMS Module

If the system is supplied with an antenna and antenna cable, it is advisable to first mount the antenna in a suitable location (see chapter Antenna Mounting) and lay the antenna cable.

Please use a Torx screwdriver (T8 x 60) for removal and installation of the module.

1. Follow the safety instructions at the beginning of this manual!

2. (Only for an already built-in module) Remove the two marked Torx screws from the module holder plate or the cover plate of the empty slot.

2. Pull the module carefully out of the holding rail. Note that the module is firmly anchored in the connector block of the housing. You need a certain amount of force to release the module from this link. Once the connection to the connector block of the system’s backplane is loosened, the module can be easily pulled out.

3. When installing the new IMS module, please ensure that the board is correctly inserted into the two guide rails of the system housing. Non-observance can cause damage to the module and the chassis. Make sure that the module is securely locked into the connector block before you fasten the two screws.

4. Now you can put the installed module into operation.

Attachment points of an 1U IMS system
4 HPS-100: PTP / SyncE / Hardware NTP Interface

IEEE 1588 v2 compatible

Profiles: IEEE 1588v2 Default Profile
IEEE 1588v1 (option)
Enterprise Profile
IEC 61850-9-3 Power Profile
IEEE C.37.238-2011 Power Profile
IEEE C.37.238-2017 Power Profile
ITU-T G.8265.1 Telecom Frequency Profile
ITU-T G.8275.1 Telecom Phase / Time Profile (full timing support)
ITU-T G.8275.2 Telecom Phase / Time Profile (partial timing support)
ITU-T G.8275.3 Telecom Phase / Time Profile (full timing support)
SMPTE ST 2059-2 Broadcast Profile
IEEE 802.1AS TSN/AVB Profile
AES67 Media Profile
DOCSIS 3.1

PTP Modes: Multicast/Unicast Layer 2 (IEEE 802.3)
Multicast/Unicast Layer 3 (UDP IPv4/IPv6)
Hybrid Mode
E2E / P2P Delay Mechanism
Up to 128 messages/second per client

NTP Mode: NTP Server mode (8 ns time stamp accuracy)
NTPD Software Service (15,000 req./s)

1588 Clock Mode: 1-Step, 2-Step for both Master and Slave operation

Synchronous Ethernet: Master and Slave Capability
Compliant to ITU-T G.8261, G.8262 and G.8264
Ethernet Synchronization Messaging Channel (ESMC)

Network Protocols: IPv4, IPv6
DHCP, DHCPv6
DSCP
IEEE 802.1q VLAN filtering/tagging
IEEE 802.1p QOS

Ethernet Interface: Combo Port: 1 x 100/1000BASE-T RJ45, 1 x GBIT SFP - Slot
USB Interface: USB 1.1 / USB 2.0 full-speed, Micro USB female connector

Signal Outputs: 2x SMA, TTL (50 Ohm) connectors
configurable signals: 1PPS, 10MHz, 2048kHz

CPU: 825 MHz Cortex A9 Dual Core on SOC

Time Stamp Accuracy: 8 ns
**LED Indicators**

LED St: Init lights blue during initialisation, off in normal operation mode.

LED In: red Error - TSU does not work correctly, PTP services stopped.
yellow No link, but initialized.
green link up.
red stopped.

LED A - LED B: Shows the current State of the TSU.
yellow - yellow Listening.
green - off Master Mode.
off - green Slave Mode.
yellow - off Passiv Mode.
off - yellow uncalibrated.
red - yellow stopped.

**Performance Level Options:**

<table>
<thead>
<tr>
<th>Option</th>
<th>Unicast Clients</th>
<th>Delay Req/s</th>
<th>NTP Req/s</th>
<th>PTPv1 Monitoring</th>
<th>PTP Monitoring</th>
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<tr>
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<td>1024</td>
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<td>51200</td>
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<tr>
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<td>NO</td>
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<tr>
<td>PL-D</td>
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<td>131072</td>
<td>204800</td>
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<tr>
<td>PL-E</td>
<td>2048</td>
<td>262144</td>
<td>409600</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

A detailed configuration guide you will find in the corresponding firmware manual of the system. See chapter "The Web Interface -> Configuration: PTP V2."
### 4.1 HPS100 - Global Configuration

**Operating Mode**
If supported, there is an option to run a NTP service in Server mode with hardware timestamp support. Select between PTP and NTP mode at this step. It is not possible to run both modes at the same time on one TSU card.

**Select Profile**
User can choose among preselected sets of PTP parameters defined in profiles usually used in different industries. If the default setting “Custom” is selected, the user can select any parameter combination available in the global configuration section as long as the PTP standard allows it. Depending on the selected profile, there might be profile specific parameters available which can be found in the “Profile Specific Parameters” section below the standard PTP parameters sections.
There are six different presets currently supported on PTP cards:

In Multicast and Unicast Mode:
- Default E2E IEEE 1588-2008
- Default P2P IEEE 1588-2008
- Power IEEE C37.238
- Telecom ITU-T G.8275.1

In Unicast
Master / Slave Mode: Telecom ITU-T G.8265.1

In Unicast or Multicast
Master / Slave Mode: SMPTE ST 2059-2

More information about the settings of the HPS unit can be found in the current LANTIME firmware manual.

4.2 Option: Output Configuration

The HPS100 module is equipped with one Gigabit Ethernet SFP/RJ45 Combo Port for network synchronization and two SMA output connectors. The following list shows the available output signals:

- Off (inactive - no signal selected)
- PPS (generated locally on the HPS100, inverted)
- 10 MHz (generated locally on the TSU)
- 2.048 MHz (taken from active internal clock module)
- 10 MHz (taken from active internal clock module)
- PPS (taken from active internal clock module)

Per default no output signal is active on both outputs.
4.3 Firmware Update via Web Interface

If you need to update the software of your HPS100 time stamp unit, you need a specific update file. You can download the latest HPS100 firmware version from our website: https://www.meinbergglobal.com/english/sw/refclock-updates.htm

The update file can be uploaded to the HPS100 by first choosing the file on your local computer with the 'Browse' button and then press 'Start Update'. Afterwards you are prompted to confirm the start of the update process.